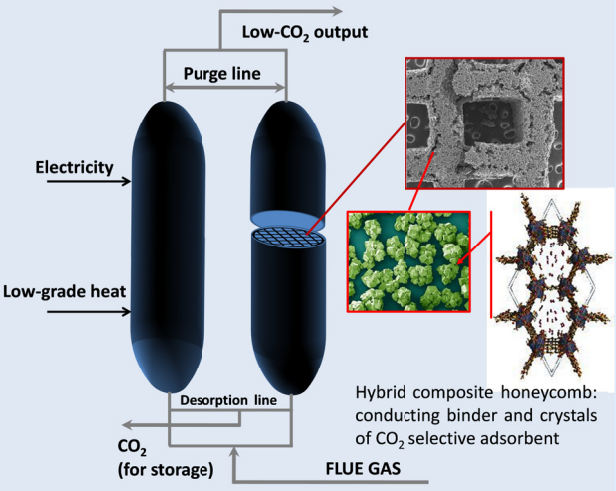
Public summary

The vision of MATESA is to develop a new-generation high-efficiency capture process based on selective adsorption of CO_2 on hybrid honeycomb monoliths. This innovative process is termed as Electric Swing Adsorption (ESA). In ESA, the adsorbent regeneration is performed by passing electricity through the adsorbent releasing adsorbed CO_2 that can be recovered at high purity. The predicted energy savings of the developed process may transform this CO_2 capture process in a key component to make CCS commercially feasible in fossil fuel power plants going into operation after 2020.

In order to realize a "proof of concept" of the ESA process, a strong component of the project will deal with the development of a hybrid material that is able to selectively adsorb CO_2, conduct electricity, result in a low pressure drop and have reduced environmental impact. The development of such a material is important for MATESA and will also have a significant impact on the energy efficiency of other relevant gas separation processes.

In MATESA, two world-leading companies will join forces with universities and R&D institutes to develop an advanced hybrid honeycomb adsorbent material to be used in an integrated CO_2 capture process in a power plant. The environmental footprint of the new-generation process will be used as an optimization tool and will be tackled by an innovative SME with intensive experience in Life Cycle Assessment (LCA).

R&D SUMMARY



Innovation in MATESA:

- MOF scale-up & formulation
- Hybrid MOF conductive honeycomb
- High CO_2 loading adsorbent
- Advanced ESA cyclic process
- Efficient heat &electricity use
- Integration if mixed sources of energy
- Innovative life cycle assessment

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MATESA -Advanced materials and electric swing adsorption process for CO_2 capture

Project details
Call: ENERGY5.1.2012
Contract No. 608534
Starting date: 1/9/2013
Duration: 36 months
Total budget: € 5709158
EC contribution: €2965707
www.sintef.no/MATESA

SEVENTH FRAMEWORK PROGRAMME

Project consortium

Stiftelsen SINTEF
(Dr. Richard Blom)

University of Belgrade
(Prof. Menka Petkovska)

Fraunhofer IKTS
(Dr. Hans-Jürgen Richter)

University of Torino
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MONASH University
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ADVANCED MATERIALS AND ESA FOR CO_2 CAPTURE

PROJECT OBJECTIVE:

Make a "**proof of concept**" of an adsorption technique termed Electric Swing Adsorption (ESA) as a **new-generation high-efficiency** post-combustion CO_2 capture process.

MATERIAL CHALLENGES

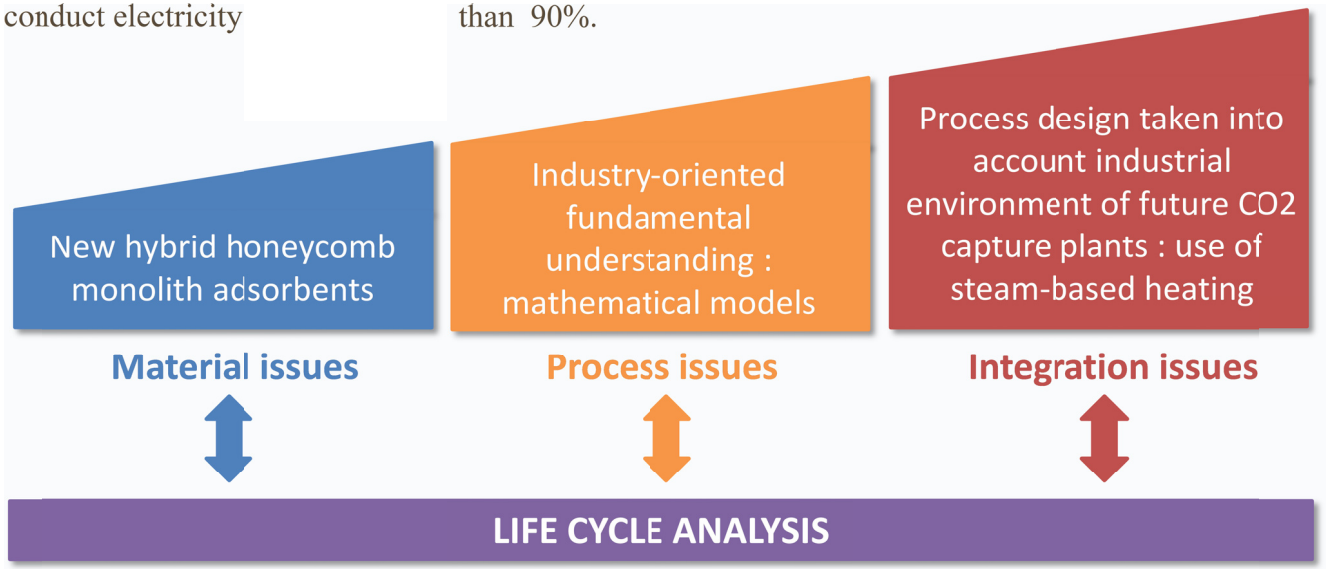
Develop a material with high selectivity towards CO_2 with high loading that is able also to conduct electricity

PROCESS CHALLENGES

Engineer an energy-efficient ESA that produces high-purity CO_2 with a capture rate higher than 90%.

INTEGRATION CHALLENGES

Minimize the energy penalty and reduce the cost of CO_2 capture for the ESA process.



ENVIRONMENTAL BENEFITS: Evaluate the cost of the ESA process developed in the project and also its environmental footprint.

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